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Correlations between Personality Structure and Adrenocortical Excretion Patterns in MZ Twins*

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Twenty-one pairs of healthy MZ twins, all males 18-21 years of age, have been studied for possible correlations between individual personality characteristics and relatively constant patterns of pituitary-adrenocortical functioning. Subjects were studied by means of psychiatric interviews, Rorschach and other psychological tests, and 35 24-hour urine collections for 17-hydroxycorticosteroid (17OHCS) and 17-ketosteroid (17KS) determinations.

Our previous observations have been reported, both on these healthy male volunteers (Fox et al, 1961 and 1965) and on various clinical syndromes (Rizzo et al, 1954; Fox et al, 1958; Gifford and Gunderson, 1970). Our cumulative clinical impressions suggested that high levels of 17OHCS excretion are found in individuals with an intense need for close personal relationships, or with an equally intense need to defend themselves against emotional involvement, by active forms of avoidance and denial. Low 17OHCS levels were found in individuals who were more effectively defended against emotional intimacy by well-organized neurotic defenses, with some isolation, constriction of affect or less conscious awareness of conflict.

In studying twins, however, an unusual pattern of high 17KS and low 17OHCS compelled us to pay more attention to the significance of 17KS levels. High 17KS excretion patterns were found in energetic, ambitious individuals, with strong aggressive drives or equally strong defenses against them. Individuals with low 17KS levels were overcontrolled, with limited drive-endowment and widespread inhibitions of impulse and action.

The present brief, preliminary report will emphasize intrapair correlations and comparisons between MZ and DZ twins in 17OHCS and 17KS excretion patterns, and their relation to our current hypotheses about the personality characteristics associated with these patterns. Our clinical and psychological impressions of the development of individual differences within MZ twin pairs and our follow-up studies after 2-7 years will be presented at a later time.

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Physical and endocrine variables of 20 MZ and 10 DZ twins were subjected to an intraclass correlation analysis, in which each pair constituted a group for a one-way analysis of variance. Intrapair correlations in 17OHCS levels showed no significant difference between MZ pairs (0.83) and DZ pairs (0.88), but in 17KS excretion patterns the correlations were significantly higher in MZ (0.86) than in DZ (0.55) pairs. This difference in intrapair correlations for 17KS excretion in MZ pairs corresponds to the findings of Osborne and DeGeorge (1959) for height and to observations of Burt (1958) on intelligence levels (0.92 for MZ and 0.54 for DZ pairs). In nontwins (healthy male medical students), Tanner et al (1959) had previously found correlations between height, relative muscularity and 17KS excretion.

Our data suggest the influence of genetic factors in KS excretion but not in 17OHCS excretion, although families would have to be studied before a polygenic hypothesis could be substantiated. In our previous studies of both single subjects and twins, the greater variability in 17OHCS compared to 17KS excretion had suggested that 17OHCS levels were more responsive to current conflicts and shifts in personal relationships, while the greater constancy of 17KS excretion was associated with constitutional factors, including muscularity and aggressive endowment.

There is a complex interrelationship between 17OHCS and 17KS excretion, through hypothalamic-anterior pituitary regulation and the interconvertibility of various end-products of adrenocortical metabolism. In our larger series, however, mean 17OHCS and 17KS have behaved statistically as independent variables, and various partial correlation techniques and transformations of the data failed to change their zero correlation. Since our personality hypotheses were based on a consideration of both variables, the mean excretion-levels for our MZ twins were arranged in a contingency table of high, middle, and low quartiles. These groupings reveal discrepancies from the expected frequencies, with *six* twins instead of two in the low 17OHCS and high 17KS cell, and no subjects in the high OHCS and low 17KS cell. The unusual occurrence of the high 17KS-low 17OHCS pattern in twins may reflect the special stimulation and intensified competitive conflicts that twins experience in growing up as a pair. This would support our previous hypotheses that high 17KS excretion is associated with strong aggressive drives. The absence of twins with a high 17OHCS-low 17KS excretion pattern may be the result of the college population from which our twins were recruited, where individuals with a low level of drive and ambition, combined with an intense need for emotional involvement, would not be highly represented.

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